5-2000

Yearly cost of the nine major soft contact lens care systems

Steve Jung
Pacific University

Ken Williams
Pacific University

Yearly cost of the nine major soft contact lens care systems

Abstract

The goal of this project is to determine the yearly cost of nine major soft contact lens care systems. Each contact lens system was used by ten subjects over a two-week period. At the end of this period the amount of solution used was determined and extrapolated out to 365 days. Yearly costs were then obtained for each of the of the different contact lens care systems based on three different retailers: a grocery store, pharmacy and department store. The values obtained in this study were then used to compare the cost of contact lens solutions to daily disposable contact lenses. The results showed that the actual amount used and the manufacturer's suggested usage varied greatly. As expected, the results showed that patients use less solution then recommended by the manufacturer or practitioner. The results of this study will allow the practitioner to educate patients on the options and cost of the many different contact lens modalities.

Degree Type

Thesis

Degree Name

Master of Science in Vision Science

Committee Chair

Patrick Caroline

Subject Categories

Optometry

Yearly Cost of the Nine Major Soft Contact Lens Care Systems

By

Steve Jung
Ken Williams

A thesis submitted to the faculty
at the Pacific University College of Optometry
Forest Grove, Oregon
For the degree of
Doctor of Optometry
May, 2000

Advisor:

Patrick Caroline

Title: Yearly Cost of the Nine, Major Soft Contact Lens Care Systems.

Steve Jung, author

Ken Williams, author

Patrick Caroline, advisor

Acknowledgement

This project was inspired by Patrick Caroline, a leading contact lens practitioner in our field. We would like to first thank Patrick Caroline for his time and expertise which made this project possible. Our gratitude also goes out to Pacific University College of Optometry for their support. Lastly, we would like to thank all of our subjects who participated in our study. With their help we were able to collect the necessary data to complete our study.

Autobiographies

Steve Jung

Steve Jung was born in Seoul, Korea on April 28,1973. He grew up in Beaverton, Oregon. He attended University of California at Berkeley where he received a Bachelors of Science in Biology. He was a member of the Acacia Fraternity at Berkeley. He is currently in his fourth year of optometry school at Pacific University.

Ken Williams

Ken Williams was born in Colorado Springs, Colorado on October 18, 1970 where he spent most of his young adult life. He received his Bachelors of Science in Medical Technology from the University of Colorado. After receiving his degree he spent two years working as a medical technologist before entering Pacific University College of Optometry. After graduating from Pacific University College of Optometry he hopes to obtain an associateship position in Colorado and eventually own an optometric practice.

Abstract

The goal of this project is to determine the yearly cost of nine major soft contact lens care systems. Each contact lens system was used by ten subjects over a two-week period. At the end of this period the amount of solution used was determined and extrapolated out to 365 days. Yearly costs were then obtained for each of the of the different contact lens care systems based on three different retailers: a grocery store, pharmacy and department store. The values obtained in this study were then used to compare the cost of contact lens solutions to daily disposable contact lenses. The results showed that the actual amount used and the manufacturer's suggested usage varied greatly. As expected, the results showed that patients use less solution then recommended by the manufacturer or practitioner. The results of this study will allow the practitioner to educate patients on the options and cost of the many different contact lens modalities.

Table of Contents

Background

There have been several studies examining the estimated yearly cost for the various soft contact lens care systems with varied outcomes. Because of the patient to patient variation in amount of solution used, it can be a very difficult task to determine the actual amount used per year. Each care system has its own recommendation for usage, yet some do not give specific details concerning cleaning, rinsing and storage. Another variable to consider is the patient's wear schedule, such as extended wear, daily wear, full-time wear and part-time wear.

A past study done by Silbert(1993) instructed test subjects to use the manufacturer's recommendations for each care system. It showed that the estimated annual cost were as follows: AOSEPT $231.65, RENU $318.45, OPTIFREE $388.84 and ULTRACARE $449.83. Although this study provided cost differences between multicare and hydrogen peroxide systems, only four soft lens care systems were examined.

Another study by Reindel et.al. used the Nielsen Marketing Research Data in an attempt to determine the actual annual cost for the different soft lens systems based on consumer buying trends. This study was different because it used purchasing data instead of test subjects for actual usage in determining the yearly costs of lens care systems. The results showed on average that patients spend $82.45 on hydrogen peroxide systems and $38.14 on multipurpose systems. These results were well below the theoretical estimates determined by those that conducted this study.

A more recent study by Dillahay et. al. involved the extensive use of test subjects to determine the actual usage of seven soft lens care systems based on manufacturer's guidelines. The usage results were then compared to the cost of the products to determine the final yearly estimated costs for each of the lens care systems. The results showed that the estimated annual cost were ULTRACARE $176.16, PURE EYES $140.50, OPTI-FREE $132.80, QUICK CARE $123.13, RENU $79.38, COMPLETE $64.80 and SOLOCARE $55.04. This study provided useful estimates of actual usage and cost of the various care systems, but two important systems, AOSEPT and OPTI-ONE, were excluded.

Our study is similar to the previous study by using test subjects to determine actual usage and using the data to determine the annual costs of the nine major soft lens care systems. Our study involved both a "theoretical" patient usage which was based on the manufacturer's guidelines and "actual" patient usage based on patients using each system in their normal manner.

Methods

The purpose of our study was to determine and compare the yearly costs of all nine soft lens care systems and to compare these results to the yearly cost of daily disposable lenses. Prices for the lens care systems were gathered from grocery, pharmacy and department stores and then averaged. Finally, values were extrapolated to 365 days to determine the estimated annual cost of each lens system.

Initially, we determined the "theoretical" cost for each of the nine lens care systems based on manufacturer's recommended guidelines. For each lens care system we measured the full bottles of applicable solution for each system using a highly sensitive scale measuring to the nearest tenth of a gram. For each system the strict guidelines were followed to measure each of the three basic steps: cleaning, rinsing, and storage. The only enzyme system that we used and calculated was daily Supraclens in the Opti-Free system. The amount of theoretical usage of cleaning solutions was determined by counting out each of the recommended number of drops and measuring the volume used. For the rinsing step the recommended time was applied and if no specific time was given twenty seconds was used. Twenty seconds was chosen because it was the recommended time given for the rinsing step by the Opti-free system. For lens storage, each lens case was filled as indicated by the package insert.

The theoretical measurements were carried out as if one were to wear their contact lenses daily for a two-week period. We then determined the theoretical amount used for each of the solutions in a system for two weeks. The amount of solution used was determined by subtracting the solution remaining in each bottle from the initial volume of a full bottle. To estimate the annual theoretical cost we extrapolated the two-week period out to 365 days.

The next part of our study used subjects who were soft contact lens wearers to determine the "actual" or "experimental" usage of the nine soft lens care systems. Test subjects were volunteer optometry students who had worn soft contact lenses for at least three months. Thirty test subjects were used and were randomly assigned three different soft lens care systems. The subjects were instructed to use each of the soft lens care systems for a period of two weeks while wearing their soft contact lenses in a daily wear mode. Specific instructions were not given to each of the test subjects, but instead they were all instructed to use each "as they normally would". Patients using non-familiar systems were given a brief overview of the system but no specific instructions were given about the amount of solution to use. The subjects were also instructed to write down the total number of days each care system was used in case they did not wear contacts for the full two-week period. At the end of the six week period, after using each system for two weeks, all of the remaining and empty (used) bottles were collected. (See attached patient instructions for contact lens solution thesis). The returned solutions were carefully measured in the same manner as the theoretical portion of the study. We again extrapolated the two-week period out to 365 days to determine the yearly cost based on actual patient usage.

To determine the actual cost of the annual usage of each system, we priced each lens care system at three Portland area retailers. These retailers included a grocery store, pharmacy and department store. The prices obtained were regular non-sale prices. The annual cost was then determined by multiplying the annual amount of solution used by the actual cost of the products. The end result was an estimated annual cost for each of the nine soft contact lens care systems.

Results

The "theoretical" annual lens care system costs are listed starting with the most expensive: AOSEPT $357.51, ULTRACARE $319.24, PURE EYES $268.72, RENU $234.77, OPTI-FREE $173.27, OPTI-ONE $140.73, COMPLETE $114.41, QUICKCARE $97.73 and SOLOCARE $69.70 (See Average Theoretical Cost Chart). As suspected, the three hydrogen peroxide systems in our study were the most expensive. The yearly cost of AOSEPT was the most of the three hydrogen peroxide systems at $88.78 more than PURE EYES and $38.27 more than ULTRACARE. PURE EYES was the least expensive hydrogen peroxide system as it utilizes the cost effectiveness of a

multicare system by combining a cleaner and rinse into one solution. Increased costs with AOPSEPT and ULTRACARE are due to the use of a separate cleaner, saline, disinfectant and neutralizing disc.

In determining the "theoretical" annual cost of the multipurpose systems, we found a large variation in annual cost and amount of solution used. As one might expect all six multipurpose systems were cheaper in yearly cost than the more expensive hydrogen peroxide systems. The annual cost of RENU was the most expensive at $234.77 which was $165.07 more than the least expensive SOLOCARE. As seen in table 1 approximately 33% more RENU solution was used than OPTI-FREE and OPTI-ONE, 40% more than COMPLETE and 90% more than QUICKCARE and SOLOCARE. We found on average, the RENU system used much more solution when compared to the other systems. We believe that this huge variation in the amount used is primarily due to a larger aperture size in the RENU bottle. The effect of the larger aperture size was determined by Dillahay et. al. who showed that the RENU bottle dispensed 90% more solution than the COMPLETE bottle. This was found by using lab-simulated tests which equally applied five pounds of pressure to each bottle to measure the amount dispensed.

The results of the second portion of our study, the "experimental" determination of system cost, are listed starting with the most expensive: AOSEPT $224.57, ULTRACARE $200.19, PURE EYES $127.81, RENU $110.97, OPTI-FREE $76.12, QUICKCARE $66.80, COMPLETE $62.62, OPTI-ONE $52.69 and SOLOCARE $45.66 (See Average Experimental Cost Chart). As expected, the "experimental" results were similar to the "theoretical" results, having the three hydrogen peroxide systems being the most expensive. At an annual cost of $224.57, AOSEPT was the most expensive of the three hydrogen peroxide systems in the "experimental" study. AOSEPT was $96.76 more than PURE EYES and $24.38 more than ULTRACARE. As mentioned above, ULTRACARE was the least expensive of the hydrogen peroxide systems because of the use of the combined cleaner and rinse in one solution.

As with the theoretical findings, we again found RENU to be the most expensive of the multipurpose systems. The increased cost is again due to the large variation in the amount of solution used as seen in Table 1. The average yearly cost of RENU was

$110.97 which was 32% more than OPTI-FREE and more than double the yearly cost of SOLOCARE. There was a small price difference between the other five multipurpose systems. Only $20.46 separates the yearly costs of OPTI-FREE, QUICKCARE, COMPLETE, OPTI-ONE and SOLOCARE.

Discussion

The average "theoretical" cost of lens care solutions was much more than the average "experimental" values which can be attributed to many factors. Compliance is always a factor as patients usually do not use as much solution as recommended by the manufacturer or doctor. The manufacturer recommends rinsing the lenses thoroughly for 10 to 20 seconds, however patients do not rinse their lenses for this long of a period. A steady stream of solution for 10 to 20 seconds accounts for the large amount used in the "theoretical" portion of our study. Another additional use of solution comes from the manufacturer's suggestion to "fill" each well of the lens case. Most patients tend not to fill the case but instead use just enough disinfectant to cover the lenses. Because of the cost of solutions is so expensive, patients use less to save on money. This makes it even more imperative that the practitioner educate their patients on proper contact lens care even if it costs more.

We believe the average "experimental" costs are more realistic values because the findings are based on actual patient usage. The results can be used when presenting options concerning care systems to your patients. The experimental findings will give patients an estimate of how much they should expect to spend in a full year for a particular lens care system. If cost is a factor for the patient the doctor can use the annual estimates to choose a system within the patients budget.

Looking at the high cost of solutions leads us to consider the use of daily disposable lenses. The yearly cost of two major daily disposable lenses are included in both the theoretical and experimental graphs. The yearly cost was determined by using the wholesale cost per pair multiplied by 365 days. Daily disposable lenses are higher in lens cost but there are no solutions involved in their daily care. With conventional or planned replacement, cost is determined by both the materials and lens care solutions. With the high cost of solutions added to lens cost, the total can be greater than daily disposables. A good candidate for daily disposables would be the highly sensitive

patients who use the more expensive hydrogen peroxide systems, as the costs of either method would be very similar. By using daily disposables you can eliminate allergic reactions to solutions as well as the high cost of using a hydrogen peroxide system.

Conclusion

The information found in our study will provide practioners the necessary information needed to present options to their soft contact lens wearers. Daily disposable lenses are an ideal lens choice for highly sensitive patients and those patients where compliance is a problem. Using the results from our research, practioners will be able to show patients the cost of daily disposables compared to planned replacement lenses, while providing the very best in contact lens care.

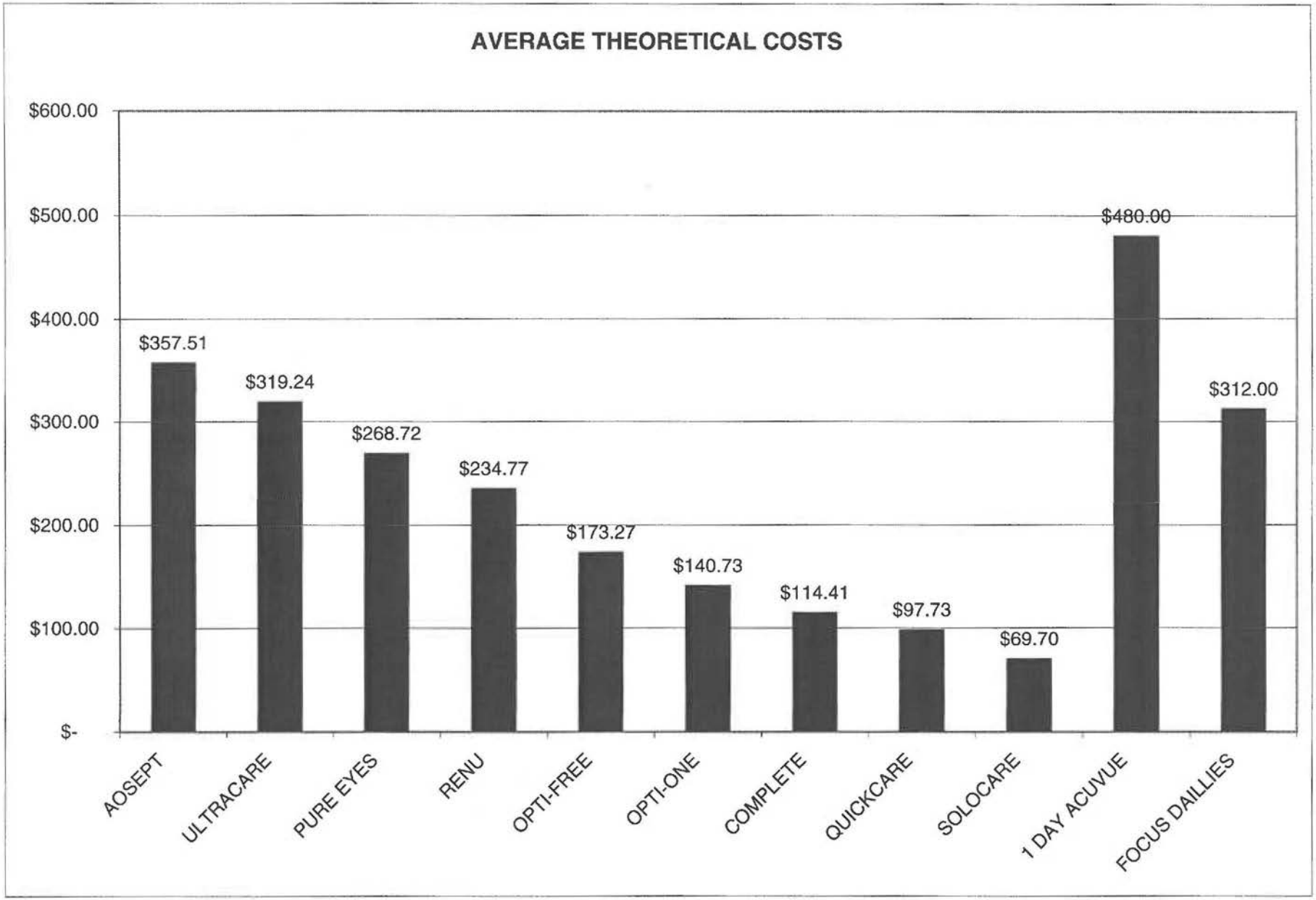
Patient Instructions for Contact Lens Solution Thesis-Real usage group

1. Please use each of the given systems as you "normally" would for cleaning, rinsing, disinfection and storage.
2. You will be given 3 different brands of solution. Use each brand of solution for exactly 2 weeks. At the end of the 2 weeks, discontinue use and place all empty or partially used bottles in the bag. You may keep any unopened bottles. We will contact you and set up a time to collect all empty and partially used bottles at the end of the six week period.
3. If you do not use the system for exactly 14 days, please mark below the total number of days that the system was used.
   If you run out of any portion of a system, mark the number of days used below and start on the next system.
4. Thank you very much for your participation and if you have any questions or problems please call Ken (617-3018) or Steve (645-7207).
5. If you experience an allergic reaction please discontinue use immediately and give us a call.

Name of system #1_____
Total number of days used out of 14_____

Name of system #2_____
Total number of days used out of 14_____

Name of system #3_____
Total number of days used out of 14_____


AVERAGE THEORETICAL COSTS
$600.00
$500.00
$400.00
$300.00
$200.00
$100.00
$-
$357.51
$319.24
$268.72
$234.77
$173.27
$140.73
$114.41
$97.73
$69.70
$480.00
$312.00
AOSEPT
ULTRACARE
PURE EYES
RENU
OPTI-FREE
OPTI-ONE
COMPLETE
QUICKCARE
SOLOCARE
1 DAY ACUVUE
FOCUS DAILLIES

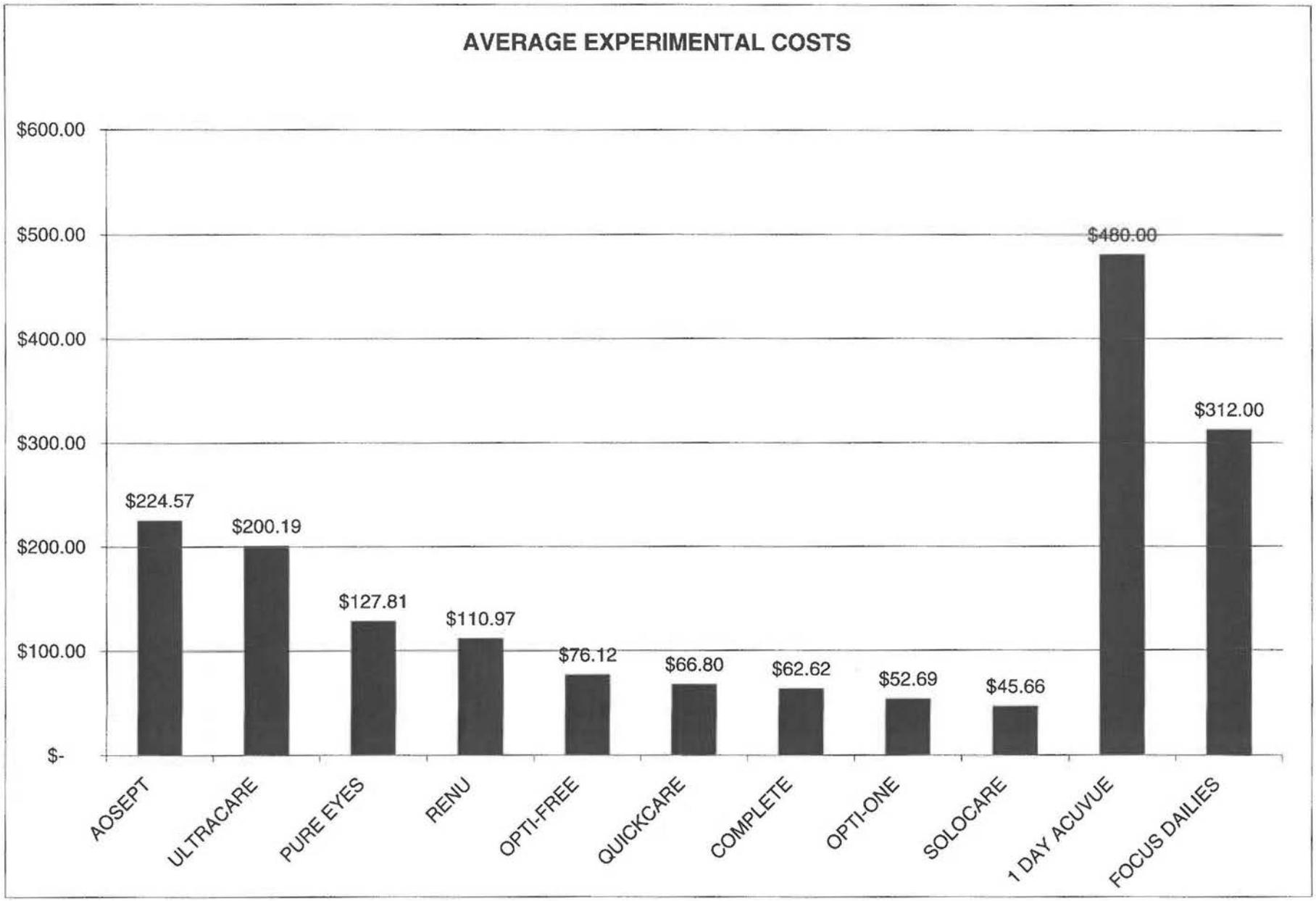

AVERAGE EXPERIMENTAL COSTS
$600.00
$500.00
$400.00
$300.00
$200.00
$100.00
$-
$224.57
$200.19
$127.81
$110.97
$76.12
$66.80
$62.62
$52.69
$45.66
$480.00
$312.00
AOSEPT
ULTRACARE
PURE EYES
RENU
OPTI-FREE
QUICKCARE
COMPLETE
OPTI-ONE
SOLOCARE
1 DAY ACUVUE
FOCUS DAILIES

Table 1
Theoretical Daily Usage Values

	Average Daily Useage(g)	Min. Daily Use(g)	Max Daily Use(g)	STD. Deviation
AOSEPT				
Saline	39.2	37.7	40.7	2.16
Disinfect.	23.4	22.8	23.9	0.75
Cleaner	0.17	0.17	0.17	0
PURE EYES				
Disinfect.	19.4	19.0	19.8	0.56
Cleaner	33.2	31.2	35.3	2.93
ULTRACARE				
Saline	35.7	35.3	36.1	0.52
Disinfect.	11.7	11.3	12	0.45
Cleaner	0.21	0.2	0.23	0.02
OPTI-FREE				
Solution	23.8	23.5	24.1	0.42
SupraClens	0.17	0.16	0.18	0.02
OPTI-ONE				
Solution	24.6	24	25.2	0.81
COMPLETE				
Solution	17	16.9	17.2	0.17
SOLOCARE				
Solution	13.6	12.8	14.5	1.22
RENU				
Solution	30.6	29.8	31.4	1.15
QUICKCARE				
Starting Soln.	0.1	0.09	0.11	0.14
Finishing Soln.	14.3	14.2	14.5	0.24

Table 2
Experimental Daily Usage Values

	Average Daily Useage(g)	Min. Daily Use(g)	Max Daily Use(g)	STD. Deviation
AOSEPT				
Saline	9.5	5.8	15.7	3.11
Disinfect.	21	15.6	25.5	3.66
Cleaner	0.2	0.1	0.7	0.21
PURE EYES				
Disinfect.	12.7	10.9	14.5	1.12
Cleaner	8.8	5.9	12.7	2.43
ULTRACARE				
Saline	14.4	10.3	20.5	3.28
Disinfect.	11.3	10	13	0.97
Cleaner	0.2	0.1	0.3	0.1
OPTI-FREE				
Solution	9.5	6.2	15	3.26
SupraClens	0.2	0	0.2	0.1
OPTI-ONE				
Solution	9.2	5.3	16.6	3.71
COMPLETE				
Solution	9.3	4.4	12	2.53
SOLOCARE				
Solution	8.9	7.8	12.1	1.48
RENU				
Solution	14.5	9	24.5	4.85
QUICKCARE				
Starting Soln.	0.3	0.1	0.4	0.12
Finishing Soln.	9.8	5.7	13.6	3.1

Reference

1. Silbert, J.A. Gubman, D.T. Understanding the Cost Differences Among Soft Contact Lens Care Systems. Contact Lens Spectrum, 1993; 10:46-50.

2. Reindel, W.T., et al. Soft Contact Lens Solution Expenditures Among Various System Buyers. Contact Lens Spectrum, 1992; 5:32-5.

3. Gower, L.A., et al. Compliance: A Comparison of Three Lens Care Systems. Optometry and Vision Science. 1994; 71 (10):629-634.

4. Dillahay, Sally, et al. Ciba Corporation Sponsored Study. 1998.

5. T.T. Tyler Thompson, OD. Tyler's Quarterly Soft Contact Lens Parameter Guide. Vol. 16. No. 4.